Electronic Chronic Disease Registers Based on Accreditation Standards for Family Medicine Teams

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SUMMARY. Agency for Quality and Accreditation of Federation of Bosnia and Herzegovina (AKAZ) has developed computer based chronic disease register based on the accreditation standards in order to facilitate maintenance of chronic disease registers in the absence of electronic health records, and to speed up and simplify calculation for over 70 clinical indicators from accreditation standards for family medicine teams. This article presents development of the software and its practical use.
Keywords: Family medicine teams, Accreditation standards, Electronic chronic disease registers.

1. INTRODUCTION

Agency for healthcare quality and accreditation in Federation of Bosnia and Herzegovina (AKAZ) is authorised body in the field of healthcare quality and safety improvement and accreditation of healthcare institutions (1). Beside accreditation standards for hospitals (2) and primary health care centres (3), AKAZ has also developed accreditation standards for family medicine teams(4,5).

Seven chapters / topics: (1. Physical factors; 2. Equipment; 3. Organisation and Management; 4. Health promotion and illness prevention; 5. Clinical services; 6. Patient survey; i 7. Patient's rights and obligations) contain 35 standards describing expected level of family medicine team's quality. Standard 3.3 "Medical records and reg-

isters" requires keeping registers of 10 chronic diseases. Further on, the fifth chapter contains ten standards of clinical services (5.1 "Coronary heart disease", 5.2 "TIA and Stroke", 5.3 "Arterial Hypertension", 5.4 "Diabetes mellitus", 5.5 "Cancer", 5.6 "Chronic Obstructive Disease", 5.7 "Bronchial Asthma", 5.8 "Epilepsy", 5.9 "Hypothyroidism", 5.10 "Mental Diseases") with 74 clinical indicators in total.

Family medicine teams in FB&H are obligated to use paper based health records and rarely use EHR. In order to facilitate the keeping of required chronic disease registers and to speed up and simplify the

self assessment and external assessment process of above mentioned ten clinical services standards and their clinical indicators, AKAZ has developed computer based chronic disease registers based on accreditation standards for family medicine teams. One of the main imperatives was to create computer program which would be very user friendly and require minimal team's time and effort.

2. METHOD OF DEVELOPMENT

2.1. Database development

Since this was the first version of database, for simple design mechanism and straightforward user in-
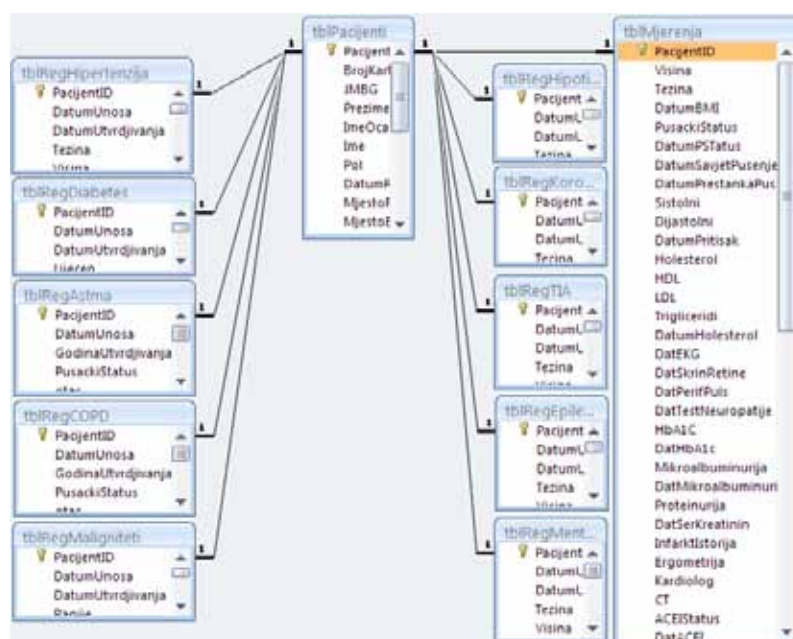

Figure 1. Schematic Presentation of the Database Relationships

Figure 4. Startup screen wellcomes the user and gives basic information about the registers

terface, we decided to utilise Microsoft® Access 2000. The fields included in the database are based on 74 clinical indicators of accreditation standards for family medicine teams.

We created 12 tables: one for patient's basic demographic data, one for various data needed for indicators, and one for each of the chronic diseases. The main table, called "tblPacijenti", contains patient's ba-

sic demographic data such as number of patient's paper based health record, name, surname, gender, date of birth, etc. It connects all of the other tables trough one-to-one relationship (Figure 1.). This is based on the fact that one patient can have only one record per one disease register.

As different standards share some data, like systolic blood pressure

or date of smoking cessation counselling, all those data are kept in table called "tblMjerenja" which is directly connected to "tblPacijenti" trough one-to-one relationship, and thus indirectly to all the other tables. It is based on the fact that we did not tend to develop electronic health record but just an electronic registers

Figure 5. Main Switchboard gives the user option to chose from several activities
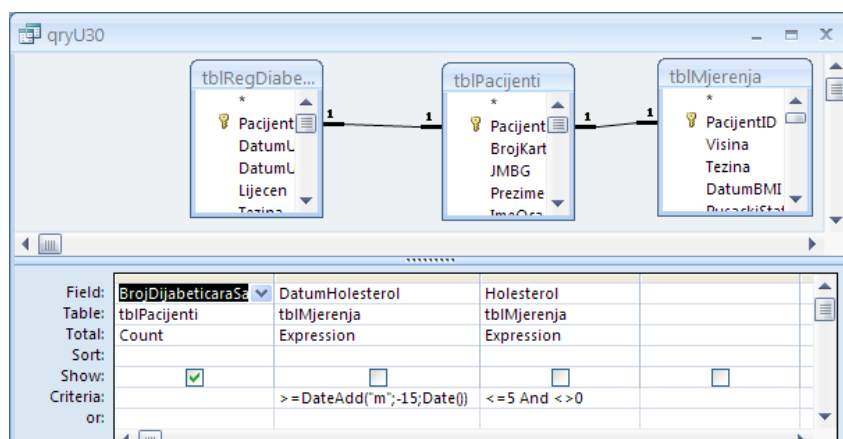

Figure 2. Query design: "qryU30"–query required for clinical indicator "U 30" which calculates number of team's registered diabetic patients whose last measured total cholesterol within the pervious 15 months is 5 mmol/l or less. The number will be converted to percentage in the next step in query "qryStandard54"
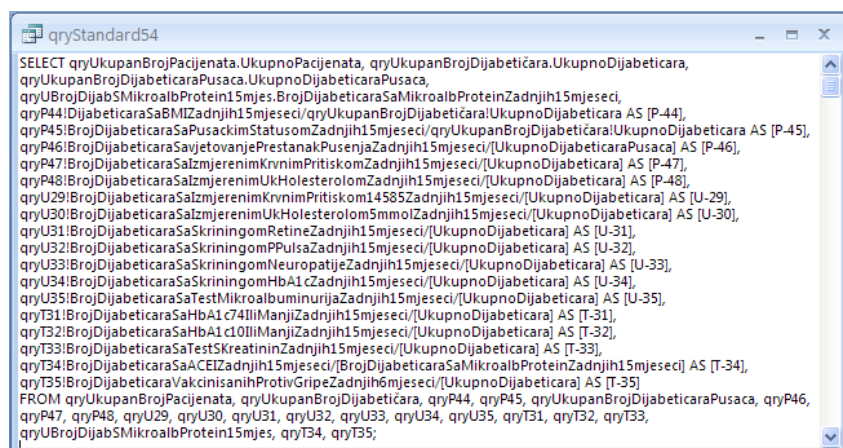

Figure 3. Manualy written SQL code "qryStandard54"–query required for summarizing all clinical indicators of standard 5.4 "Diabetes mellitus"

with the ability to store latest patient's data required for the purpose of calculating clinical indicators. Thus, every patient can have only one latest specific data (blood cholesterol for instance) and, if the patient has records in two or more registers, that data can be shared between different clinical indicators concerning different chronic diseases.

For every chronic disease register there is a separate table ("tblReg-COPD", "tblRegDiabetes",...) and they contain only data specific for the register, like year of diagnosing or patient's family history of disease.

2.2. Query development

In order to calculate 74 indicators for 10 accreditation standards from data entered in the database and to summarise the indicators by standards, we created a series of 107 queries using MS Access's query design wizard for simple ones (Figure 2.), and direct SQL coding (Figure 3.) for more complex ones.

2.3. . User Interface Development

For purpose of navigation trough the electronic registers and its options we created several forms. Start-up screen (Figure 4) welcomes the user and gives basic information

Figure 7. frmRegHipertenzija showing patient's main data in hypertension register

required for clinical indicators like weight and BMI (automatically calculated), smoking status, blood pressure, specific therapy status,… and corresponding dates. Those data are shared between different registers. Data fields can automatically change color to red and act as reminders for the user if something is wrong, like, for example, some test has not been performed, or the date of latest status check is too old. Third page can contain any additional notes user choose to enter.

We also created forms for displaying current values of clinical indicators (Figure 9.). This way family medicine teams can view their progress at any time. Indicators from any of ten standards and their values are shown in three columns representing basic, advanced and terminal indicators. If the user needs to print these indicator values for the purpose of self assessment or external assess-

about the registers. It is followed by Main Switchboard which gives the user option to choose from several activities. The main form is "frm-Pacijenti" (Figure 6.) which is used to add, view, and edit patient's basic demographic data stored in "tblPacijenti". It also contains fields for data about colorectal, Pap smear, and mammography screening (result, and date) which is used by some clinical indicators. If the patient is male last two groups of fields are not shown. There is a sub form containing 10 buttons representing 10 chronic disease registers, on the right side of the form. If the patient has record in some register, caption on corre-

sponding button will be bolded and in blue color, otherwise normal and black. This way user can easily see which chronic disease the patient suffers from.

Figure 6. frmPacijenti showing patient's basic data with buttons for opening different registers

If the user clicks on some button, new form will open showing patient's record in corresponding chronic disease register. Register's forms, like "frm-RegHipertenzija" show three pages which the user choose by clicking corresponding tabs. First page (Figure 7.) contains main data like date of entering the register, date of diagnose, baseline patient's measures (height, weight, BMI,…), ICD-10 code,… Second page contains data required for clinical indicators.

Second page (Figure 8.) contains latest data

Figure 9. "frmStandard54" shows current values of clinical indicators from standard 5.4 Diabetes Mellitus

ment it can be done by generating a report for print (figure 10.). To do that user just needs to click a button on lower left side of the form.

3. END USER TESTING

After the development the software was tested during the project of WHO and AKAZ *"Quality Improvement and Accreditation program based on Accreditation Standards for Family Medicine and Performance Indicators in Two Cantons – Tuzla and Posavina"*. The software was installed
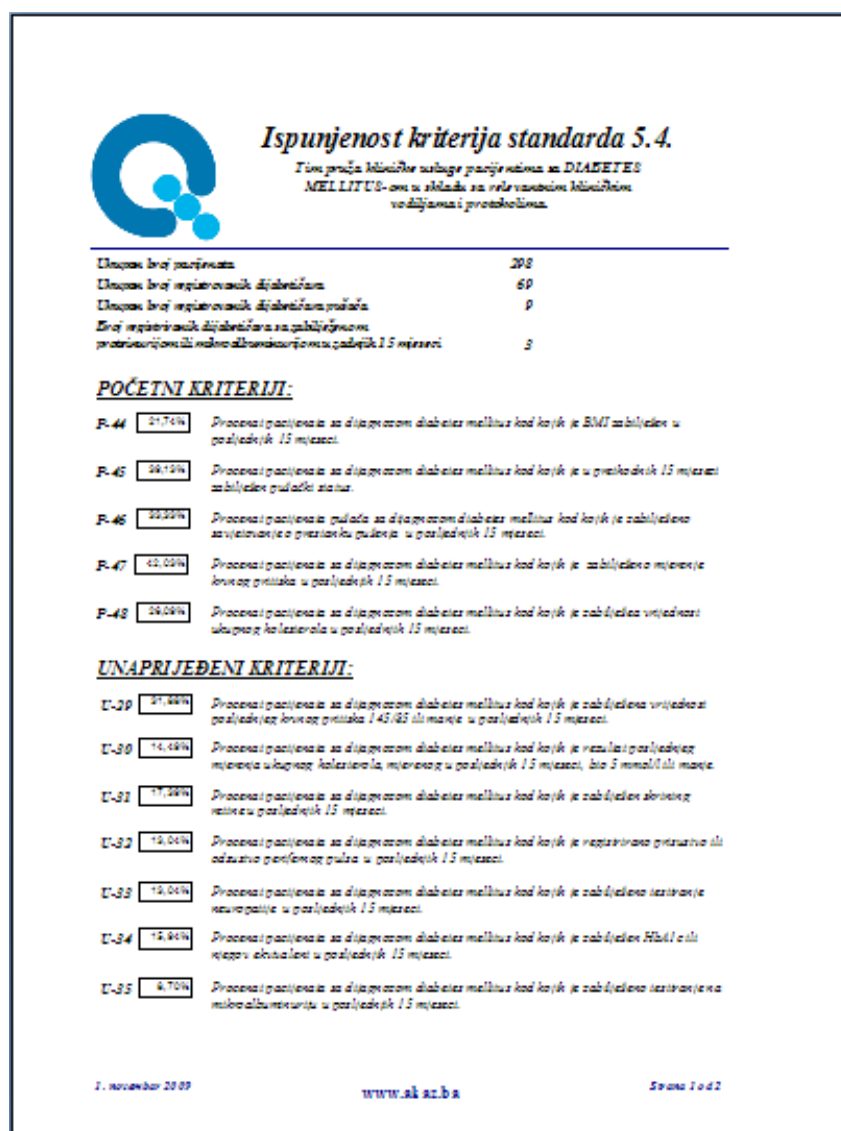

Figure 8. frmRegHipertenzija showing patient's data required for calculating clinical indicators from standard 5.3 Arterial Hypertension

Figure 10. "rptStandard54" automatically generated report for printing values of clinical indicators

4. FUTURE DEVELOPMENT

In order to overcome the identified limitation, AKAZ plans further development utilising the MS Visual Basic 2008 Express Edition tool for development of user interface linked to existing MS Access database. Software created in this fashion would eliminate the need for having MS Access installed on user computer.

5. CONCLUSION

During this project we came to conclusion that in absence of electronic health records use of AKAZ's electronic registers of chronic disease can help family medicine teams to improve their quality of their practices keeping relevant information about their patients with chronic diseases, and calculating and monitoring relevant clinical indicators.

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on nine family medicine teams' computers. Members of nine teams (doctors and nurses) were provided with software using basic training and support by telephone should there be some unclear issues concerning the use of software. During several months all teams have entered all required data into the registers. During that period of time none of the users reported any error in the software functioning or any major difficulties in using it. On contrary, majority has said that the software has been of great help and had very stimulating effect because it also acted as very good reminder and because they were able to follow their progress at any moment.

In the meanwhile, one limitation of the software was identified – prerequisite that appropriate version of MS Access is installed on user's computer. In some cases that will not be practicable or it will require additional cost for purchase of MS Access application.